1: Spier E-5 (1918) 1928
NT14 Plateau Yumans NT14
Havasupai

Bows, Arrows, and Quivers

Both the self and the sinew-backed bow are used, although the former is more common. Arrows are either arrow reeds with willow foreshafts, or entirely of wood. The position of the bowman is three-quarters face toward his quarry with the bow held vertically. It is gripped slightly below the center. The arrow is held in position with the left forefinger until ready to shoot; then it rests on that hand to the left of the bow. It is pulled back at shoulder level and the bow held rigid while it is let fly. A variety of the secondary release[1] is used, in which the arrow is grasped well forward in the feathering while the first and second finger tips bear on the string (Fig. 21). Either reed or wooden arrows are used with self or sinew-backed bows. Either bow will carry about 175

Fig. 21

Fig. 22

Fig. 21. The Variant of the Secondary Form of Arrow Release used by the Havasupai.
Fig. 22. Section of a Sinew-Backed Bow.

m., but the effective range is 30 to 45 m. At this range the arrow would penetrate a deer from 15 to 25 cm. At a shorter distance an arrow could be driven completely through a horse. Mountain sheep have been killed when shooting down from a hundred meter cliff. Allowance is made for windage; but rain and snow are said to have no effect on the flight. No prayer is said when shooting, nor will sickness or menstruating women in the house where it is kept affect the power of a bow. The arrow was carefully withdrawn after the kill; heads and feathers of broken arrows were saved.

The best wood for bows (*kûpâ'*) is called *kûp'âylma'a*, or *kûp'â*, or *puima'd*, which is probably the ash (*Fraxinus anômala* Torr.). A young tree, about 1.25 m. tall, is selected, and its branches trimmed close so that it will grow straight. In two years this is ready to cut, for the trunk

[1] Mooney, 148–150.

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322 411 is then 3 to 5 cm. through. Shaping proceeds without waiting for the pole to season. A good bow should bear a dark streak (medullary ray?) along its inner face, not on the back: such a bow will not easily break. The pole is cut to the proper length for a bow, six spans (thumb to middle finger), measured three toward each end from the middle. Some bows are only five spans. After the bark is removed, the pole is trimmed to the lines shown in Fig. 22, leaving the back in its natural state. Frequent sighting along the bow keeps the trimming symmetrical. The [412] cutting is done with a stone knife and finally rubbed smooth with a grit-stone. The width at the grip should be that of two fingers (first and middle fingers lying flat); at the ends one finger wide. Its thickness is not measured. Fiber tension in the green bow gives a marked curve opposite to that when strung. The bow is set aside to season for a month: if it is strung sooner it is likely to acquire a permanent curve. When ready for stringing the nock is cut into the edge at a convenient point. There is no wrapping for a grip, nor are decorative marks or paint applied.

411 322 237 Oak is used as well as ash for sinew-backed bows (*mɔ́ɔwd*", sinewed?): it is grown in the same way. Mesquite is also used, if it contains a dark streak. The bow resembles the self bow, but it is somewhat shorter, five spans, and only half as thick, although the width is the same. After seasoning for two months or more until it is thoroughly dry, it is ready for the sinew reinforcement. Nocks are first cut. The back is scraped as smooth as possible and fine lines are scratched on it longitudinally, [412] using a stone flake with a serrated edge. After glue is applied over half the back, a broad sinew is laid on beginning at the middle, stretching it toward the tip. This is rubbed in the same direction with a smooth stick in order to make it adhere. The process is repeated for the other half of the bow, the sinew layers lapping at the middle. Three more layers are similarly added, setting the bow in the sun to dry partially before each application. The sinew extends over the back quite to the inner face. The first two layers are brought over each end and down the face for about 1 cm. The ends of the last two layers are left free, but twisted together. A sinew is bound in the nocks to hold the sinew backing fast. When dry, the grip is bound with a buckskin thong, centering slightly [439] below the middle. Red cloth, obtained from the Hopi, is passed back [531] and forth longitudinally through this binding on the inside face, to produce a checkered effect. Red paint is used in default of cloth. The 411 sinew layers part from the wood when the bow is old. This is checked by 237 binding at intervals with sinew. This bow is always kept strung, al-

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411 other at the forward end. These are hung up to dry.) The sinew is
237 soaked in water over night, scraped with the back of a knife, and separated into fibers when partly dry. To make the bowstring, two bundles of these are rolled together between palm and thigh, new lengths being added by rolling in as needed. Three bundles were preferable; these were rolled together, never braided. The bowstring is tied permanently to the upper end; the hitch for the lower end is shown in Fig. 34a. This
[556] is a poor man's style; a rich man would tie a length of buckskin to the loose end and continue the wrapping for another 5 cm., fastening with a
411 half-hitch. To string the bow its upper end is set under the right instep, and while the lower end rests in the left hand, the bow is sprung by pressing with the left knee; then the right hand fastens the string. When strung, the spring of the bow is tried, and a song to the bow and string is chanted: hápdagwíbà (Let this be strong; let this not break).

[188]

Fig. 34 (89.9-1231, 1232). a, Ties for Bowstring; b, Method of securing Arrowhead to Shaft.

The wrist protector (*salómf*) is simply a broad band of buckskin encircling the wrist, somewhat trimmed to fit the heel of the hand. It is fastened by taking up the slack in a loop which passes through both ends of the band.

Boys sometimes use small bows of men's type but the normal boy's bow is D-shaped. One in the collection measures 60 cm. from tip to tip, the chord of the arc 25 cm.; another 68 by 25 cm. Boys use only reed arrows, with sharpened foreshafts, and feathered with the plumage of the hawk, flicker, etc.

411 Reed arrows (*dp'a"di'a'* or *di'a"dp'adi'a*; *dp'a"a*, arrow) are most
322 common. Arrow reeds (*di'd'*) are gathered green. In order to straighten them, the crooked part is pressed on hot ashes placed on a flat stone, or in the groove of an arrow-straightener (*dodóid*). Stones are also heated in the fire for this purpose.[1] The joints are then trimmed. Wooden arrows (*dp'd'a'i'i; i'i*, wood) are made of an especially hard willow (*dmamdid*, probably desert willow). These branches were peeled and left in the sun until partially dry when they could be straightened with a wrench, never by heating. The wrench (*mákwapodjid mádmadid*) is
[321] a mountain sheep shoulder blade or horn in which several holes have
[412] been drilled.

[1] The shaft is not wet with the tongue at the point to be heated as the White Mountain Apache do.

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been drilled. Straightness is determined by sighting. The arrows are next cut to proper length; for use with the self bow, from tip of forefinger to top of biceps; for the sinew-backed bow, from tip of middle finger to bottom of biceps. (This may apply to wooden arrows only). Reed arrows in the collection measure 75 to 76 cm., of which 15 cm. is foreshaft; willow arrows, 70 to 73 cm.; and boys' reed arrows, 72 to 77 cm. with 9 to 12 cm. foreshafts. Willow shafts are trimmed with a knife which like all knife movements is toward the body—and then rubbed between two grooved gritstones (*pctaudlia*) of pumice held in the hand. The shaft is a true cylinder of the diameter of arrow reeds except for a slimmer section where the feathers will be bound and for a flare at the nock. The nock (*padjatadjpá*) is next cut; in a reed arrow this comes just above a joint. The foreshaft for the reed arrow is also willow, trimmed to size, about 15 to 20 cm. long, and pointed at both ends. After this is painted red, it is glued into the pith channel of the reed. The end of the shaft is then wrapped for 2 to 3 cm. with sinew, fastened with glue, to prevent it splitting. Finally the foreshaft is split to receive the arrowhead, which is set in the mouth, glued in, and tied on with sinew, which is not, however, glued (Fig. 24b). It is prayed to that it may stay tight. Many arrows, used for small game, have simply a sharpened foreshaft.

Stone arrowheads range from 3 to 6 cm. in length; the smaller are placed on reed arrows, the larger on wooden shafts. These are triangular, with a deep, square notch in the base, and with the cutting edges reaching almost to the base. If an arrowhead tends to work loose, it is nicked well up the side to aid in retying. Stone heads were flaked on the heel of the hand with an antler tip cylinder. Bone or antler arrowheads are not used. Blunt points for stunning small game are not manufactured, but a cornnub may be placed on the point of the foreshaft for this purpose.[1]

Willow arrows are often decorated with one to three zigzag or wavy grooves (*dpdcd'ui'ga*) running the length of the shaft, representing lightning (*ehlal'djá*). These are made with a tool consisting of a wooden block with a groove across one face into which there protrudes the point of a knife thrust through from the back. The shaft is drawn through the groove, rocking it slightly, so that the point may trace a sinuous line.

The eagle and hawk furnish the best feathers for arrows, those of a smaller blue and gray hawk and possibly other birds are also used. Young

[1] It is curious that the metal points that are made have the arrow of rounded shoulders where the long joins the blade which occur in early trade examples found in various United States

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tions) at hand are: Maidu, 1 m., Salinan, 91 cm., Havasupai, 91 to 112, Western Apache, 162, Yavapai, 137, Mohave, 122 to 182, Pima, 135, Cahuilla, 122 to 137, Luiseño, 152, Southern Diegueño, 100 to 120, Cocopa, 182 to 243, Pipi[1] and Lower California Indians, 182, and Perieues, "long."[2] The exception here is the Southern Diegueño.

Mohave, Navaho, and Southern Diegueño bows at least are cut from the wood in the same way as the Havasupai. That is, the rounded back of the bow is the exterior of the tree limb, the interior is cut flat giving a trapezoidal cross-section. This may not be general.[3]

The Navaho use the same bowstring hitches as the Havasupai and also attach a length of buckskin to the string. The bowguard or wrist protector is widely used. In this area it is recorded for the Yavapai, Tonto, Havasupai, Navaho, Hopi, Mohave, Pima, Southern Diegueño, Paviotso, and Northern Shoshoni.[4]

The arrow wrench may be quite widely used. O. T. Mason ascribes it to the Plains Indians, the West Coast tribes, and the Eskimo. I have found it recorded among the Navaho, Ute, and Cheyenne,[5] as well as the Hayasupai. This is a mountain sheep horn. The Hopi use antelope or goat horn[6]; the Cheyenne bone also.

Reed arrows are apparently restricted in the Southwest and California to the tribes in the direction of the lower Colorado River. The Yavapai, Tonto, Pima, Cocopa, Pipi, Seri, and the Indians of Baja California seem to use only reed arrows[7]; wooden ones are also used by the Navaho, Havasupai, Western and Mescalero Apache, Mohave, Yuma, Cahuilla, Panamint, Luiseño, Southern Diegueño, and Maidu.[8] All other tribes mentioned in the second paragraph below apparently have wooden arrows only. The Havasupai and Luiseño favor the reed, the Cahuilla the wooden arrow. It is interesting that the Paviotso make a wooden arrow with a separate foreshaft in the manner of a reed arrow.[9]

There is also a suggestion that arrows from the lower Colorado and Baja California are longer than elsewhere. This might be expected from

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[1] A group one hundred miles below the mouth of the Gila and below the Cocopa (Pattie, 201).

[2] Dixon, (a), 203; Mason, J. A., (a), 142; Bourke, (b), 37; Whipple, Eubank, and Turner, 30; Russell, (d), 95; Kroeber, (g), 38; Sparkman, 206; Spier, (c), 350; Chittenden, 204; Bourke, 382; North, 238.

[3] Pope, 354, Pl. 46, Fig. 2; 357, Pl. 47, Fig. 7; Spier, (c), 350.

[4] Corbusier, 260; Smart, 419; Shufeldt, (a), 784; Franciscan Fathers, 319; Hough, (a), 246, 288; Whipple, 114; Russell, (d), 163; Spier, (d), 353; Lowie, (i), 245, (a), 182.

[5] Franciscan Fathers, 316; Mason, O. T., (f), 660; Grinnell, (b), I, 179.

[6] Hough, (a), 278.

[7] Whipple, 98; Smart, 419; Russell, (d), 96; Holmes, 43; Pattie, 201; McGee, 197, Bourke, 382; North, 238.

[8] Franciscan Fathers, 182, 318; Mason, O. T., (f), 638, 661; Pattie, 184; Trippel, 376; Kroeber, (c), 98; Cerrillo, 269; Sparkman, 206, 208; Spier, (c), 351; Dixon, (a), 203.

[9] Lowie, (i), 246.

4: Smithson E-5 (1951-1958) 1999 NT14 Phonon Tonnage NT14
Hawaiopai

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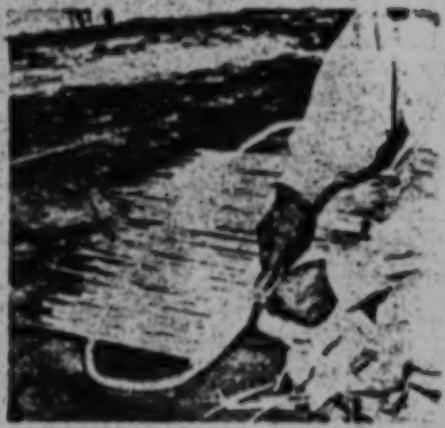

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Fig. 19. Manufacture of a cradleboard. A. Binding willow slats to oval frame. B. Trimming ends of willow to fit frame. C. Sewing buckskin strip over cloth binding which was first glued with pinyon pitch and sewed along sides of frame to cover rough ends of willow slats. D. Lisa Iditionen displaying completed cradleboard with wicker hood. Formerly, buckskin was used in place of the cloth strip; the former is still added occasionally as an extra feature if it is obtainable.